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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,358	10/30/2003	Xianglin Wang	SAM2.0032	7881
23386 7590 05/07/2007 MYERS DAWES ANDRAS & SHERMAN, LLP 19900 MACARTHUR BLVD., SUITE 1150 IRVINE, CA 92612			EXAMINER TORRES, JOSE	
			ART UNIT 2624	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/697,358	Applicant(s) WANG ET AL.	
	Examiner Jose M. Torres	Art Unit 2624	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 March 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3-21 and 23-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15,16,18 and 20 is/are allowed.
- 6) ☒ Claim(s) 1,4-14,17,19,21 and 24-40 is/are rejected.
- 7) ☒ Claim(s) 3 and 23 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Comments***

1. The Amendments filed on March 5, 2007 have been entered and made of record.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 35, 36, 38 and 40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 35, 38 and 40 recites the limitation "each of the polyphase filters" in line 9, respectively. There is insufficient antecedent basis for this limitation in the claims. However, it is appreciated that the limitation corresponds to the first and second filters and has been treated as such.

Claim 36 is dependant upon claim 35.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 4, 21 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hrytzak et al. (US 5,327,257) in view of Kim (US 2002/0067862).

Hrytzak et al. disclose a method of interpolating image positions in an original image to produce an interpolated output image, wherein the original image is represented by digital input pixel data (Col. 1 lines 6-9), comprising the steps of: (a) providing a first filter having a sharp interpolation characteristic ("two-dimensional digital filter"); (b) providing a second filter having a smooth interpolation characteristic ("smooth filter"); (c) interpolating a selected image position in the image using the first filter to generate a sharp interpolation output value ("sharp interpolated output image pixel X"); (d) interpolating a selected image position in the image using the second filter to generate a smooth interpolation output value ("soft interpolated pixel Y", Col. 4 line 54 through Col. 5 line 2 and lines 24-31); and (f) selectively combining the output values from the filters as a function of the weighting coefficients, to generate an interpolation output value for the selected image position of an interpolated output image ("interpolated out pixel P", Col. 5 lines 32-49).

As to claim 1, Hrytzak et al. does not explicitly teaches calculating a different weighting coefficient for the output of each filter by estimating the image high frequency level at the selected image positions and calculating the weighting coefficients based on the estimated image high frequency level.

Kim teaches calculating a different weighting coefficient for the output of each filter by estimating the image high frequency level at the selected image positions and

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calculating the weighting coefficients based on the estimated image high frequency level (" $a \cdot h(m,n)$ ", This term provides an enhancement value based on high frequency components. Paragraphs [0025]-[0028] and [0034]).

Therefore, in view of Kim, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hrytzak et al.'s method by incorporating the method step of calculating the weighting coefficients by calculating the high frequency level at the selected image position and obtaining the enhancement value as the weighting coefficients used in Hrytzak et al.'s equation to calculate the interpolated output pixel in order to provide an image which its visual appearance can be sharpened or can appear more vivid to a human being while preventing or suppressing the occurrence of shoots (Paragraphs [0004], [0006] and [0023]).

As to claim 4, Hrytzak et al. further teaches the interpolation output value  $q$  ("interpolated output pixel P") for the selected image position is according to the relation:  $q = r \cdot \alpha + s \cdot (1 - \alpha)$  (" $P = S \cdot X + (1 - S) \cdot Y$ ") wherein  $\alpha$  ("S") and  $(1 - \alpha)$  ("1-S") are the weighting coefficients for the first and second filters, respectively ( $0 \leq \alpha \leq 1$ ), and  $r$  ("X") and  $s$  ("Y") are the filter output values from the first and second filters, respectively (It can be shown that the equation used in Hrytzak et al. to calculate the interpolated pixel value is carried out in the same fashion wherein the weighting coefficient (S and (1-S)) is used for the output of the filters. Col. 5 lines 39-49).

As to claims 21 and 24, see claims 1 and 4, respectively, above.

6. Claims 5-14, 17, 19, 25-34, 37 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hrytzak et al. in view of Kim as applied to claim 1 above, and further in view of Wu et al. (US 5,959,693). The teachings of Hrytzak et al. modified by Kim have been discussed above.

As to claims 5-11, Hrytzak et al. modified by Kim fails to disclose the first filter comprises a one dimensional FIR polyphase filter; the second filter comprises a one dimensional FIR polyphase filter, the two polyphase filters have the same length; each of the polyphase filters comprises a  $N$ -tap  $M$ -phase polyphase filter; for arbitrary or variable interpolation ratios,  $M$  has a value of 10 or larger;  $N$  can be either an odd or even number value.

Wu et al. teaches the first filter comprises a one dimensional FIR polyphase filter (FIG. 2, "FIR filter 275"); the second filter comprises a one dimensional FIR polyphase filter (FIG. 2, "FIR filter 280"); the two polyphase filters have the same length (Length  $M$ ); each of the polyphase filters comprises a  $N$ -tap  $M$ -phase polyphase filter "3-tap filters"); for arbitrary or variable interpolation ratios,  $M$  has a value of 10 or larger (Length  $M$ );  $N$  can be either an odd or even number value ( $N = 3$ -tap, Col. 5 lines 26-67 and Col. 6 lines 34-47).

Therefore, in view of Wu et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Hrytzak et al. and Kim by incorporating the polyphase FIR filters, as taught by Wu et al., which comprises a  $N$ -tap  $M$ -phase for arbitrary or variable interpolation ratios,  $M$  has a value of 10 or larger;

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$N$  can be either an odd or even number value, as the filters used in Hrytzak et al. in order to preserve image features and improve resolution (Col. 6 lines 34-47).

As to claim 11, Hrytzak et al. further teaches the two filters are low-pass filters, such that the first filter has a sharp frequency transition band and the second filter has a smooth frequency transition band (Col. 4 line 54 through Col. 5 line 2).

As to claim 12, Kim further teaches calculating the weighting coefficient for each of the two filters further includes the steps of: estimating the image high frequency level at the selected image position (" $h(m,n)$ "), and calculating a weighting coefficient for the output of the filter based on the estimated image high frequency level (Enhancement value  $a \cdot h(m,n)$ ); and the image high frequency level at the selected image position is estimated based on the image high frequency components measured at original image pixels neighboring the selected image position (" $n-1 \dots n+1$ ", Paragraphs [0030]-[0034]).

As to claim 13, Kim further teaches the image high frequency component at the original image pixels is measured using high-pass filtering process ("high-pass filter", Paragraph [0030]).

As to claim 14, Kim further teaches the image high frequency component at the original image pixels is measured using a high-pass FIR filter (The high-pass filter described in Paragraphs [0030]-[0034] comprises a finite impulse response filter).

As to claim 17, Kim further teaches the image high frequency level at the selected image position is estimated based on the image high frequency components calculated at two original image pixels closest to the selected image position (Horizontal or vertical pixels taken into account. Paragraphs [0030]-[0031]).

As to claim 19, Kim further teaches the image high frequency level at the selected image position is estimated based on the image high frequency component measured at original image pixels that are within the filtering range of interpolation to the selected image position (The values used to calculate the high frequency level correspond to those which are within the range of enhancement. Therefore if these high frequency values are used for the interpolation process taught by Hrytzak et al. it would correspond to the interpolation range. Paragraphs [0010] and [0030]-[0034]).

As to claims 25-34, 37 and 39, see claims 5-14, 17 and 19, respectively, above.

***Allowable Subject Matter***

7. Claims 3 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 15, 16, 18 and 20 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: The closest prior art made of record fails to disclose or suggest calculating the weighting coefficients for the output of the filters based on the high frequency level at the selected image position, wherein the image high frequency component is measured according to the relations presented in the current application.

Claims 35, 36, 38 and 40 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

***Response to Arguments***

***Objections to the Specification***

8. The Specification has been amended on Page 6, line 10 to recite, "combined to achieve a better image interpolation result" to correct sentence grammar.

The Specification has been amended on Page 8, line 2 to recite, "range of interpolation, are checked. The image high" to correct sentence grammar.

The Specification has been amended on Page 26, line 21 to recite, "circuits, as Application-Specific Integrated Circuit (ASIC), as firmware, etc. as is known to those" to correct the term definition of "ASIC". Therefore, the objection has been removed.

*Claim Rejections under 35 U.S.C. § 102*

9. Applicant's arguments, see Page 20 on the Remarks Section of the Amendment, filed March 5, 2007, with respect to the rejection(s) of claim(s) 1 and 21 under 35 U.S.C. § 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made (See Claim Rejections - 35 USC § 103 Section above).

*Claim Rejections under 35 U.S.C. § 103*

10. Applicant's arguments, see Pages 20-26 on the Remarks Section of the Amendment, filed on March 5, 2007, with respect to the rejection(s) of claim(s) 2, 4-14, 17, 19, 22, 24-34, 37 and 39 under 35 U.S.C. § 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made (See Claim Rejections - 35 USC § 103 Section above).

***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Song disclose a Method for Adaptively Sharpening Electronic

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Images, Hershberger disclose a Vestigial Sideband Generator Particularly for Digital Television and Kato et al. disclose a Video Image Transforming Method and Apparatus.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jose M. Torres whose telephone number is 571-270-1356. The examiner can normally be reached on Monday thru Friday: 8:00am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on 571-272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JMT  
04/30/2007



JINGGE WU  
SUPERVISORY PATENT EXAMINER